

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of: Varanasi et al.	]	Art Unit 1762
	]	
Serial No. 10/765,256	]	Examiner: B. Chen
	]	
Filed: January 26, 2004	]	Confirmation No: 9581
	]	
For: DEPOSITION OF IRON OXIDE	]	Attorney Docket: 1-15610
COATINGS ON A GLASS	]	
SURFACE	]	

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July 13, 2009

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

**BRIEF ON APPEAL**

Honorable Sir:

This brief is in furtherance of the Notice of Appeal, which was timely filed in connection with the above-captioned application on May 11, 2009. This Brief is being filed under the provisions of 37 CFR §41.37 and its related requirements. The fees required under 37 CFR 1.17(F) are submitted herewith.

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1. Real Party in Interest

The real party in interest is Pilkington, North America, which is a subsidiary of Pilkington Group Limited, which is a subsidiary of Nippon Sheet Glass Limited of Japan.

2. Related Appeals and Interferences

There is no known pending appeal or interference which will directly affect, or be directly affected by, or have a bearing on, the Board's decision in this Appeal.

3. Status of Claims

On May 11, 2009, applicant submitted a Notice of Appeal in connection with the subject application, appealing the rejection of claims 1-14, 16-20 and 27-29.

The status of each of the claims is as follows:

1. Claims cancelled: 15 and 21-26;
2. Claims withdrawn from consideration but not cancelled: None;
3. Claims pending: 1-14, 16-20 and 27-29;
4. Claims allowed: None;
5. Claims rejected: 1-14, 16-20 and 27-29.

The claims on appeal are 1-14, 16-20 and 27-29. A copy of the claims on file is submitted in the attached Claims Appendix.

4. Status of Amendments

No amendment was filed subsequent to the rejection of the application by the Office Action of January 15, 2009..

5. Summary of Claimed Subject Matter

The present invention, as defined by independent claim 1, defines a method for depositing an iron oxide coating on a glass article by atmospheric pressure chemical vapor deposition in an on-line float glass process. The method comprises providing a heated glass substrate having a surface on which the coating is to be deposited, premixing ferrocene and an oxidant to form a uniform gaseous precursor mixture, directing the precursor mixture toward and along the surface to be coated and reacting the precursor mixture at or near the surface of the glass substrate to form an iron oxide coating. The iron oxide coating formed thereby is primarily in the form of  $\text{Fe}_2\text{O}_3$ .

Support for an iron oxide coating on a glass article can be found, at least, on page1, line 1.

Support for atmospheric pressure chemical vapor deposition can be found, at least, on page 1, line 1.

Support for an on-line float glass process can be found, at least, on page 3, lines 9-10.

Support for providing a heated glass substrate having a surface on which the coating is to be deposited, can be found, at least, on page 3, line 13 of the application as filed.

Support for premixing ferrocene and an oxidant to form a uniform gaseous precursor mixture, can be found, at least, on page 3, lines 15 and 16 of the application as filed.

Support for directing the precursor mixture toward and along the surface to be coated and reacting the precursor mixture at or near the surface of the glass substrate to form an iron oxide coating can be found, at least, on page 3, lines 15 and 16 of the application as filed.

Support for the iron oxide coating formed thereby is primarily in the form of  $\text{Fe}_2\text{O}_3$ , can be found, at least, on page 3, line 8 of the application as filed.

The present invention, as defined by independent claim 16, defines a method of utilizing ferrocene in an atmospheric pressure chemical vapor deposition process which occurs in an on-line float glass process to form an iron oxide layer primarily comprising  $\text{Fe}_2\text{O}_3$  on a substrate. The ferrocene and an oxidant are mixed premixed and subsequently delivered to the substrate for use in the chemical vapor deposition process. An additional coating is applied between the iron oxide layer and the substrate.

Support for ferrocene can be found, at least on page 2, line 13.

Support for an atmospheric pressure chemical vapor deposition process can be found, at least, on page 1, line 1.



Support for an on-line float glass process can be found, at least, on page 3, lines 9-10.

Support for an iron oxide layer primarily comprising  $\text{Fe}_2\text{O}_3$  on a substrate can be found, at least, on page 3, line 8.

Support for the ferrocene and an oxidant being premixed and subsequently delivered to the substrate for use in the chemical vapor deposition process can be found, at least, on page 3, lines 15-16.

Support for an additional coating applied between the iron oxide layer and the substrate can be found, at least, on page 2, lines 4-5.

6. Grounds for Rejection to be Reviewed on Appeal

On January 15, 2009, the Examiner issued an Office Action in connection with the present application. The Office Action was made final. The Examiner rejected the claims as follows:

A) Claims 1-14, 16-20 and 29 were rejected under 35 USC §103 as being unpatentable over Halaby (US 3,892,888) in view of Robinson et al (US 2002/0135099) or vice versa and further in view of McCurdy (US 6,238,738)..

B) Claims 27 and 28 were rejected under 35 USC §103 as being unpatentable over Halaby in view of Robinson et al or vice versa and further in view of McCurdy, and further in view of Higby (US 5,780,372).

## 7. Arguments

Claims 1-14 and 28 stand or fall together and will be argued collectively herein, in particular with regard to independent claim 1.

Claims 16-20 and 25-27 stand or fall together and will be argued together herein.

### Rejection of claims 1-14

The invention as claimed in claim 1 defines a method for depositing an iron oxide coating on a glass article by atmospheric pressure chemical vapor deposition in an on-line float glass process. The method comprises providing a heated glass substrate having a surface on which the coating is to be deposited. Ferrocene and an oxidant are premixed to form a uniform gaseous precursor mixture. The precursor mixture is directed toward and along the surface to be coated and reacted at or near the surface of the glass substrate to form an iron oxide coating. The iron oxide coating formed thereby is primarily in the form of  $\text{Fe}_2\text{O}_3$ .

The Halaby reference cited by the Examiner is addressed to a method of producing a magnetic recording or storage device. Halaby teaches the deposition of an iron coating, or an  $\alpha$ -ferric oxide film on a substrate, which may be glass, and converting the film to a magnetite film or a  $\gamma$ -ferric oxide film through extended exposure to a reducing atmosphere at high temperature. The film is produced through a chemical vapor deposition process which does not need to be sealed off from the outside atmosphere (thus can apparently be at atmospheric pressure).

The Robinson reference discloses a method and system for fabricating articles made from thermoset resins using an ionic mold release agent. Robinson teaches that float glass having a tin oxide enriched surface can be provided with an ionic release agent externally to the tin oxide surface (paragraph 9). Paragraph 35 notes that a thin metal coating can be applied to the “air side” of a float glass for formation of the mold through, for example, CVD.

The Examiner has added the McCurdy reference to show the conventionality of using a precursor mixture to form the metal oxide.

It is respectfully submitted that the teaching of Halaby would not lead one skilled in the art to the present invention as defined in amended claim 1. There is nothing in the Halaby and Robinson references to suggest premixture of the reactants to form a uniform gaseous precursor mixture and the subsequent delivery of this mixture to the float glass. There is nothing to suggest that the processes of Halaby and/or Robinson would be suitable for use in the method of McCurdy. Thus the invention as claimed in claim 1 distinguishes over any reasonable combination of the applied references.

Applicants further submit that Halaby is addressed to the production of a magnetic recording media. Robinson is addressed to the production of a mold with a metal oxide surface compatible with ionic release agents. The subject matter of these two references greatly differ, being in two different classifications, and addressing totally different subject matters. The McCurdy reference is drawn to the preparation of glazings. It is respectfully submitted that outside of the present disclosure, one skilled in the art would not be motivated to combine the teachings of these three very dissimilar references to propose a combination used in the production of architectural glazings.

Only McCurdy is in any way related to the process of the present invention, and it would not be obvious to combine that reference with the applied Robinson and Halaby references.

Further, as noted previously, applicants submit that the teachings of Halaby are not at all consistent with an on-line float glass process. An on-line float glass process is beneficial in that it proceeds as a continuous process (as opposed to a batch process) at a considerable rate of speed. One of the limiting factors in depositions done in an on-line float glass process is the deposition rate of the reaction. While low deposition rates are acceptable in batch process, they are totally unsuitable for the on-line float glass process. Halaby suggests that the process for producing its desired final products can occur in a period of from 15 minutes to 10 hours (column 3, lines 26-29.) This number is quite reasonable for a batch process, but would be completely incompatible with an on-line process. Thus, the teachings of Halaby are compatible with batch processes, but are incompatible with the on-line float glass process as defined and claimed in claim 1. This also yields further evidence of the incompatibility of combining the Halaby reference with the Robinson reference. The float glass process of Robinson would be incompatible with the batch process of Halaby. Therefore, it is submitted that claim 1 further defines over the applied art of record.

In light of the forgoing, it is submitted that independent claim 1 is distinguishable over the applied art of record. Claims 2-14 depend on claim 1 and are believed to be allowable based, at least, upon this dependence.

### Rejection of Claim 28

Claim 28 depends from claim 1, which is believed to be allowable for the reasons stated above, and is believed to be allowable based, at least, on this basis.

### Rejection of claims 16-20, 25 and 26

Claim 16 is similar to claim 1, in that it defines a method of utilizing ferrocene in an atmospheric pressure chemical vapor deposition process which occurs in an on-line float glass process to form an iron oxide layer on a substrate. The ferrocene and an oxidant are premixed and delivered to the substrate for use in the chemical vapor deposition process, and the iron oxide layer formed is primarily  $\text{Fe}_2\text{O}_3$ . An additional coating is applied between the iron oxide coating and the substrate.

Again, Halaby is addressed to a method of producing a magnetic recording or storage device. Halaby teaches the deposition of an iron coating, or an  $\alpha$ -ferric oxide film on a substrate, which may be glass, and converting the film to a magnetite film or a  $\gamma$ -ferric oxide film through extended exposure to a reducing atmosphere at high temperature. The film is produced through a chemical vapor deposition process which does not need to be sealed off from the outside atmosphere (thus can apparently be at atmospheric pressure).

The Robinson reference discloses a method and system for fabricating articles made from thermoset resins using an ionic mold release agent. Robinson teaches that float glass having a tin oxide enriched surface can be provided with an ionic release agent externally to the tin oxide surface (paragraph 9). Paragraph 35 notes that a thin

metal coating can be applied to the “air side” of a float glass for formation of the mold through, for example, CVD.

The Examiner has again cited the McCurdy reference to show the conventionality of using a precursor mixture to form the metal oxide.

It is respectfully submitted that the teaching of Halaby would not lead one skilled in the art to the present invention as defined in amended claim 16. There is nothing in the Halaby and Robinson references to suggest premixture of the reactants. There is nothing to suggest that the processes of Halaby and/or Robinson would be suitable for use in the method of McCurdy. Thus the invention as claimed in claim 1 distinguishes over any reasonable combination of the applied references.

Applicants further submit that Halaby is addressed to the production of a magnetic recording media. Robinson is addressed to the production of a mold with a metal oxide surface compatible with ionic release agents. The subject matter of these two references greatly differ, being in two different classifications, and addressing totally different subject matters. The McCurdy reference is drawn to the preparation of glazings. It is respectfully submitted that outside of the present disclosure, one skilled in the art would not be motivated to combine the teachings of these three very dissimilar references to propose a combination used in the production of architectural glazings. Only McCurdy is in any way related to the process of the present invention, and it would not be obvious to combine that reference with the applied Robinson and Halaby references.

Further, as noted previously, applicants submit that the teachings of Halaby are not at all consistent with an on-line float glass process. An on-line float glass process is

beneficial in that it proceeds as a continuous process (as opposed to a batch process) at a considerable rate of speed. One of the limiting factors in depositions done in an on-line float glass process is the deposition rate of the reaction. While low deposition rates are acceptable in batch process, they are totally unsuitable for the on-line float glass process. Halaby suggests that the process for producing its desired final products can occur in a period of from 15 minutes to 10 hours (column 3, lines 26-29.) This number is quite reasonable for a batch process, but would be completely incompatible with an on-line process. Thus, the teachings of Halaby are compatible with batch processes, but are incompatible with the on-line float glass process as defined and claimed in claim 16. This also yields further evidence of the incompatibility of combining the Halaby reference with the Robinson reference. The float glass process of Robinson would be incompatible with the batch process of Halaby. Therefore, it is submitted that claim 16 further defines over the applied art of record.

In light of the forgoing, it is submitted that independent claim 16 is distinguishable over the applied art of record. Claims 17-20, 25 and 26 depend directly or indirectly from claim 16 and are believed to be allowable based, at least, upon this dependence.

#### Rejection of Claim 27



Claim 27 depends from claim 16, which is believed to be allowable for the reasons stated above, and is believed to be allowable based, at least, on this basis.

CONCLUSION

In view of the above arguments, it is therefore respectfully submitted that each of the independent claims are allowable over the applied art of record. As claims 1 and 16 are patentable for the reasons discussed, and as claims 2-14, 27-20 and 27-29 depend directly or indirectly from these independent claims, applicant submits these claims are likewise patentable. An expeditious determination by the Board to that effect is respectfully requested.

Respectfully submitted,

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**CLAIMS APPENDIX**

1. A method for depositing an iron oxide coating on a glass article by atmospheric pressure chemical vapor deposition in an on-line float glass process, comprising:  
  
providing a heated glass substrate having a surface on which the coating is to be deposited;  
  
premixing ferrocene and an oxidant to form a uniform gaseous precursor mixture;  
  
directing the precursor mixture toward and along the surface to be coated; and  
  
reacting the precursor mixture at or near the surface of the glass substrate to form an iron oxide coating,  
  
wherein the iron oxide coating formed thereby is primarily in the form of  $\text{Fe}_2\text{O}_3$ .
2. The method according to claim 1 further comprising providing an inert carrier gas with the ferrocene and oxidant.
3. The method according to claim 1 wherein the oxidant is oxygen gas.
4. The method according to claim 1 further comprising cooling the coated glass article to ambient temperature.

5. The method according to claim 2, wherein the inert carrier gas comprises at least one of helium and nitrogen.

6. The method according to claim 1 wherein the iron oxide coating deposited by the process is deposited at a rate of greater than or equal to about 200 Å/sec.

7. The method according to claim 2, wherein the gas phase ferrocene concentration is in the range of about 0.1 to about 5.0%.

8. The method according to claim 2, wherein the gas phase ferrocene concentration is in the range of about 0.3 to about 3.0%.

9. The method according to claim 2, wherein the gas phase ferrocene concentration is in the range of about 0.6 to about 2.5%.

10. The method according to claim 2, wherein the gas phase oxidant concentration is about 1 to about 50%.

11. The method according to claim 2, wherein the gas phase oxidant concentration is about 3 to about 40%.

12. The method according to claim 2, wherein the gas phase oxidant concentration is about 5 to about 35%.
13. The method according to claim 1, wherein the deposited iron oxide coating as a thickness between about 300 and about 700 Å
14. The method according to claim 2, further comprising dissolving the ferrocene in a solvent.
16. A method of utilizing ferrocene in an atmospheric pressure chemical vapor deposition process which occurs in an on-line float glass process to form an iron oxide layer primarily comprising  $\text{Fe}_2\text{O}_3$  on a substrate, wherein the ferrocene and an oxidant are premixed and subsequently delivered to the substrate for use in the chemical vapor deposition process, and wherein an additional coating is applied between the iron oxide layer and the substrate.
17. The method according to claim 16 comprising depositing an iron oxide layer on the substrate at a rate of greater than or equal to about 200 Å/sec.

18. The method according to claim 16, wherein the iron oxide layer has a thickness between about 300 and about 700 Å.
19. The method according to claim 16, wherein the deposited iron oxide layer has a thickness between about 400 and about 650 Å.
20. The method according to claim 16, wherein the deposited iron oxide layer has a thickness between about 500 and about 625 Å.
27. The method according to claim 16, wherein the article formed thereby is an architectural glazing.
28. The method according to claim 1, wherein the coated article formed thereby is an architectural glazing.
29. The method according to claim 1, further comprising depositing an additional coating between the iron oxide coating and the substrate.

**EVIDENCE APPENDIX**

none

**RELATED PROCEEDINGS APPENDIX**

none